WHAT IS CLAIMED IS:

1. A method for automatic determination of optical parameters of a layer stack, such as layer thicknesses, refractive indices, or absorption coefficients, comprising the steps of:

- acquiring an optical spectrum at one location of the layer stack;
- calculating an analysis spectrum on the basis of specified optical parameter values;
- comparing the acquired optical spectrum to the analysis spectrum;
- optimizing the calculated analysis spectrum to the measured spectrum,
- classifying the acquired measured spectrum on the basis of curve shape parameters that characterize the measured spectrum and are determined therefrom, and
- comparing those curve shape parameters to corresponding spectrum curve shape parameters calculated for known layer stacks in order to determine values or value ranges for the optical parameters to be identified, on the basis of which the analysis spectrum or spectra for comparison with the measured spectrum is/are calculated.

2. The method as defined in Claim 1, wherein the acquired measured spectrum is classified on the basis of one or more of the following curve shape parameters: local noise of the spectrum; mean of the spectrum; standard deviation of the mean; number and location of the extremes; a classification of the extremes, e.g. as to spectral location; intensity values or relative spacings between them; features of enveloping curves of the minima and maxima; an averaged curve profile; beats; and parameters from the Fourier-transformed curves of the acquired measured spectrum, such as the number, location, and values of the extremes present therein.

3. The method as defined in Claim 2, wherein in order to restrict the value ranges for the optical parameters to be determined, an evaluation of the acquired measured spectrum is additionally accomplished, depending on the type of layer stack, in accordance with an extremes method and/or a Fourier transform method.

4. The method as defined in Claim 1, wherein the optimization of the calculated analysis spectrum to the measured spectrum is performed by means of known coarse and fine fitting methods.

5. The method as defined in Claim 1, wherein the values determined for optimization of the calculated analysis spectrum are optionally corrected for the optical parameters to be determined.

6. A method for automatic determination of the composition sequence of a layer stack, comprising the steps of:

- acquiring an optical measured spectrum from a location in the layer stack,
- classifying the measured spectrum on the basis of curve shape parameters that characterize the measured spectrum and are determined therefrom, and
- identifying one or more possible composition sequences of the layer stack by comparison to corresponding curve shape parameters of classified spectra belonging to known layer stacks.

7. The method as defined in Claim 6, wherein simultaneously with the identification of the composition of the layer stack from the comparison to curve shape parameters of the classified spectra, value ranges are determined for the further optical parameters to be identified.

8. The method as defined in Claim 6, wherein on the basis of the identified composition sequence of the layer stack as well as any further optical parameter values, analysis spectra are calculated and are optimized to the acquired spectra.

9. The method as defined in Claim 6, wherein the identified composition sequence of the layer stack, as well as any further identified optical parameters, are subjected to an inspection before the automatic determination of optical parameters of the layer stack by comparing those curve shape parameters to corresponding spectrum curve shape parameters calculated for known layer stacks, on the basis of the determined optical parameter the analysis spectrum or spectra for comparison with the measured spectrum is/are calculated.

10. A computer program having program code means, the computer program carries out the steps:

- acquiring an optical spectrum at one location of the layer stack;
- calculating an analysis spectrum on the basis of specified optical parameter values;
- comparing the acquired optical spectrum to the analysis spectrum;
- optimizing the calculated analysis spectrum to the measured spectrum,
- classifying the acquired measured spectrum on the basis of curve shape parameters that characterize the measured spectrum and are determined therefrom, and
- comparing those curve shape parameters to corresponding spectrum curve shape parameters calculated for known layer stacks in order to determine values or value ranges for the optical parameters to be

identified, on the basis of which the analysis spectrum or spectra for comparison with the measured spectrum is/are calculated,

when the computer program is executed on a computer or a corresponding computation unit.

11. The computer program as defined in Claim 10, wherein the acquired measured spectrum is classified on the basis of one or more of the following curve shape parameters: local noise of the spectrum; mean of the spectrum; standard deviation of the mean; number and location of the extremes; a classification of the extremes, e.g. as to spectral location; intensity values or relative spacings between them; features of enveloping curves of the minima and maxima; an averaged curve profile; beats; and parameters from the Fourier-transformed curves of the acquired measured spectrum, such as the number, location, and values of the extremes present therein.

12. The computer program as defined in Claim 11, wherein in order to restrict the value ranges for the optical parameters to be determined, an evaluation of the acquired measured spectrum is additionally accomplished, depending on the type of layer stack, in accordance with an extremes method and/or a Fourier transform method.

13. The computer program as defined in Claim 10, wherein the optimization of the calculated analysis spectrum to the measured spectrum is performed by means of known coarse and fine fitting methods.

14. The computer program as defined in Claim 10, wherein the values determined for optimization of the calculated analysis spectrum are optionally corrected for the optical parameters to be determined.

15. The computer program as defined in Claim 10, wherein a program code means is stored on a computer-readable data medium, for carrying out the method when the computer program is executed on a computer or a corresponding computation unit.